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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPLICANT:	Kurihara et al.	EXAMINER: Duong, Thoi V.
SERIAL NO.:	09/634,312	GROUP ART UNIT: 2871
FILED:	August 8, 2000	Docket: JP919990161US (8728-410)
FOR:	TOUCH SENSOR TYPE LIQUID CRYSTAL DISPLAY AND LIQUID CRYSTAL DISPLAY	

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Dated: December 14, 2005

Eric M. Parham

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants:	KURIHARA et al.	Examiner:	DUONG, Thoi V.
Serial No.:	09/634,312	Art Unit:	2871
Filed:	August 8, 2000	Docket No.:	JP919990161US (8728-410)

On: TOUCH SENSOR TYPE LIQUID CRYSTAL DISPLAY AND LIQUID CRYSTAL DISPLAY

APPEAL BRIEF

This is an Appeal from a Final Office Action mailed on July 11, 2005, finally rejecting Claims 1-20, from an Advisory Action mailed on September 27, 2005, maintaining said rejections, and from a Notice of Panel Decision from Pre-Appeal Brief Review mailed on November 14, 2005, granting permission to proceed to the Board of Patent Appeals and Interferences. Applicants appeal pursuant to the Notice of Appeal received by the USPTO on October 14, 2005, and respectfully submit this appeal brief.

Appeal from Group 2871

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1. Real Party in Interest

The real party in interest is INTERNATIONAL BUSINESS MACHINES CORPORATION, the assignee of the entire right, title and interest in and to the subject application by virtue of an assignment of record in the United States Patent and Trademark Office.

2. Related Appeals and Interferences

There are no Appeals or Interferences known to Applicant, Applicant's representatives or the Assignee, which would directly affect or be indirectly affected by or have a bearing on the Board's decision in the pending Appeal.

3. Status of Claims

Claims 1-20 are pending, stand rejected, and are currently under appeal. Copies of Claims 1-20, as pending, are presented in the Claims Appendix. Claims 1, 5, 10, 12 and 13 are independent claims.

4. Status of Amendments

Claims 1, 5, 8, 10, 12, 13 and 15-20 were amended or presented during prosecution. The Claims Appendix indicates the status of Claims 1-20. Claims 1-20 were not amended after Final Rejection.

5. Summary of Claimed Subject Matter

Touch sensor type liquid crystal displays are provided and claimed. As set forth in Claim 1, a touch sensor type (*see* Application at page 1, lines 16-19) liquid crystal display comprises a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap (*Id.* at page 23, lines 13-17; page 29, line 13 to page 30, line 3); a plurality of columnar (page 23, lines 2-7; *see also* page 9, lines 4-17; page 16, lines 13-21) gap controlling spacers (page 21, line 7), each of which restricts a width of the gap and a spacer movement in a planar direction (page 22, lines 16-17), each of the spacers having two members (page 36, line 17 to page 37, line 5) with one of the two members contacting the first substrate to define a first contact surface and the other of the two members contacting the second substrate to define a second contact surface (page 22, lines 11-15) and the two members contacting each other at a point intermediate between the first and second substrates (page 22, line 19; page 37, lines 1-3), wherein a cross-section of each spacer parallel to the plane of a substrate at said intermediate point is no larger in area than either of said first and second contact surfaces (page 33, lines 17-19); and a touch sensor added to the liquid crystal display panel including fixed and movable electrode plates (page 21, lines 8-13).

As set forth in Claim 3, another touch sensor type liquid crystal display is provided, wherein arranged densities of said gap controlling spacers are set according to the number of times of touching the touch sensor (page 11, lines 2-12).

As set forth in Claim 4, another touch sensor type liquid crystal display is provided, wherein an arranged density of said gap controlling spacers is high in a center of the liquid crystal display panel (page 11, lines 13-21).

As set forth in Claim 5, another touch sensor type (page 1, lines 16-19; page 21, lines 8-13) liquid crystal display comprises a liquid crystal display panel having array and color filter substrates arranged oppositely to each other by a specified gap (page 23, lines 13-17; page 29, line 13 to page 30, line 3); a gap controlling spacer (page 21, line 7) for restricting a width of the gap and a spacer movement in a planar direction (page 22, lines 16-17), each spacer having two members (page 36, line 17 to page 37, line 5) with one of the two members contacting the array substrate and the other of the two members contacting the color filter substrate (page 22, lines 11-15) and the two members contacting each other at a point intermediate between the array and color filter substrates (page 22, line 19; page 37, lines 1-3), the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces (page 33, lines 17-19); and a touch sensor added to the liquid crystal display panel including fixed and movable electrode plates (page 21, lines 8-13); and a grid arranged between the fixed and movable electrode plates (page 21, lines 17-19), wherein arranging positions of said gap controlling spacer and said grid are coincident with each other (page 25, lines 13-19).

As set forth in Claim 10, another touch sensor type (page 1, lines 16-19) liquid crystal display comprises a liquid crystal display panel having first and

second substrates arranged oppositely to each other by a specified gap (page 23, lines 13-17; page 29, line 13 to page 30, line 3); a gap controlling spacer (page 21, line 7) formed in a columnar shape for restricting a width of the gap (page 23, lines 2-7; *see also* page 9, lines 4-17; page 16, lines 13-21), each spacer having two members (page 36, line 17 to page 37, line 5) with one of the two members contacting the first substrate and the other of the two members contacting the second substrate (page 22, lines 11-15) and the two members contacting each other at a point intermediate between the first and second substrates (page 22, line 19; page 37, lines 1-3), the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces (page 33, lines 17-19); and a touch sensor added to the liquid crystal display panel including movable and fixed electrode plates (page 21, lines 8-13).

As set forth in Claim 12, another touch sensor type (page 1, lines 16-19) liquid crystal display comprises a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap (page 23, lines 13-17; page 29, line 13 to page 30, line 3); a touch sensor added to the liquid crystal display panel including movable and fixed electrode plates (page 21, lines 8-13); and a gap controlling spacer (page 21, line 7) for restricting a width of the gap, each spacer having two members (page 36, line 17 to page 37, line 5) with one of the two members contacting the first substrate and the other of the two members contacting the second substrate (page 22, lines 11-15) and the two members contacting each other at a point intermediate between the first and

second substrates (page 22, line 19; page 37, lines 1-3), wherein said gap controlling spacer is brought into surface-contact with one selected from the first and second substrates, the gap therebetween being restricted by the gap controlling spacer with the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces (page 33, lines 17-19).

As set forth in Claim 13, another touch sensor type (page 1, lines 16-19; page 21, lines 8-13) liquid crystal display comprises a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap (page 23, lines 13-17; page 29, line 13 to page 30, line 3); and gap controlling spacers (page 21, line 7), each of which restricts a width of the gap and a spacer movement in a planar direction, each of the spacers having two members (page 36, line 17 to page 37, line 5) with one of the two members contacting the first substrate and the other of the two members contacting the second substrate (page 22, lines 11-15) and the two members contacting each other at a point intermediate between the first and second substrates (page 22, line 19; page 37, lines 1-3), the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces (page 33, lines 17-19), wherein arranged densities of said gap controlling spacers are not uniform (page 11, lines 2-21).

6. Grounds of Rejection to be Reviewed on Appeal

A. Claims 1, 2, 5-12, 19 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,852,487 to Fujimori et al. (the '487 or Fujimori) in view of U.S. Patent No. 5,499,128 A to Hasegawa et al. (the '128 or Hasegawa).

B. Claims 13-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Application Publication No. JP 2000-227596 by Yanagawa et al. (Yanagawa) in view of Hasegawa.

C. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujimori in view of Hasegawa and further in view of U.S. Patent No. 6,331,881 B1 to Hatano et al. (the '881 or Hatano).

D. Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujimori in view of Hasegawa and further in view of Yanagawa.

7. Argument

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the burden of presenting a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993). The burden of presenting a *prima facie* case of obviousness is only satisfied by showing an objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the pertinent art would lead that individual to combine the relevant teachings of the references. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). A *prima facie* case of

obviousness is established when the teachings of the prior art alone would appear to have suggested the claimed subject matter to one of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 782 (Fed. Cir. 1993).

The suggestion to combine the references should come from the prior art, and the Examiner cannot use improper hindsight gleaned from the invention itself to pick and choose among disclosures in the prior art for combination to arrive at the claimed invention. *In re Fine*, 837 F.2d at 1075. If the Examiner fails to establish a *prima facie* case, the rejection is improper and must be overturned. *In re Rijckaert*, 9 F.3d at 1532 (citing *In re Fine*, 837 F.2d at 1074).

It is respectfully submitted that at the very least, the references of Fujimori in view of Hasegawa, taken individually or in any combination, are legally insufficient to sustain a *prima facie* case of obviousness against independent Claims 1, 5, 10 or 12. Further, it is respectfully submitted that the reference of Yanagawa is unavailable to support, much less sustain, a *prima facie* case of obviousness against independent Claim 13. In addition, it is respectfully submitted that the references of Fujimori in view of Hasegawa further in view of Hatano, taken individually or in any combination, are legally insufficient to sustain a *prima facie* case of obviousness against dependent Claim 3.

For the reasons set forth below, Appellants respectfully request that the claim rejections under 35 U.S.C. § 103(a) be reversed.

A. Claims 1, 2, 5-12, 19 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujimori in view of Hasegawa.

(i). Fujimori in view of Hasegawa fails to teach or suggest "a cross-section of each spacer parallel to the plane of a substrate at said intermediate point is no larger in area than either of said first and second contact surfaces" as claimed in Claim 1.

Claim 1 recites, *inter alia,* a "touch sensor type liquid crystal display comprising: a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap; a plurality of columnar gap controlling spacers, each of which restricts a width of the gap and a spacer movement in a planar direction, each of the spacers having two members with one of the two members contacting the first substrate to define a first contact surface and the other of the two members contacting the second substrate to define a second contact surface and the two members contacting each other at a point intermediate between the first and second substrates, wherein a cross-section of each spacer parallel to the plane of a substrate at said intermediate point is no larger in area than either of said first and second contact surfaces; and a touch sensor added to the liquid crystal display panel including fixed and movable electrode plates" (emphasis added).

Thus, Claim 1 recites subject matter in which the spacers are columnar, have two members where the cross-sectional area at the contact section between the spacer members is no larger than the contact area between either spacer member and its respective substrate, and the touch sensor includes both fixed and movable electrode plates.

Similarly, Claim 5 recites subject matter in which a spacer is columnar, has two members where the cross-sectional area at the contact section between the spacer members is no larger than the contact area between either spacer member and its respective substrate, and the touch sensor includes fixed and movable electrode plates with a grid between them, where the grid is coincident with the spacer.

Similarly, Claim 10 recites subject matter in which a spacer is columnar, has two members where the cross-sectional area at the contact section between the spacer members is no larger than the contact area between either spacer member and its respective substrate, and the touch sensor includes fixed and movable electrode plates.

Similarly, Claim 12 recites subject matter in which a spacer is columnar, has two members where the cross-sectional area at the contact section between the spacer members parallel to the plane of a substrate is no larger than the contact area between either spacer member and its respective substrate, and the touch sensor includes fixed and movable electrode plates.

The '487 patent reference to Fujimori et al. is generally directed to a touch-sensing LCD with a mesh spacer. The Examiner's contention that Fujimori shows columnar spacers is arguable. The Examiner is correct that Fujimori does suggest that columnar spacers might be substituted for the mesh spacer shown and described by Fujimori as its "polymer projection 11" (Fujimori at col. 8, lines 58-64; *see also* Fujimori's Claim 1, lines 14-16), but Applicants respectfully suggest that the disclosure of Fujimori with columnar spacers substituted for the

mesh spacer in a touch sensor type LCD would be unworkable, at least because Fujimori has not disclosed method or structure for surrounding and retaining the liquid crystal in the absence of the mesh spacer. That is, the liquid crystal layer of Fujimori's touch-sensor type LCD would leak out if the mesh spacer were replaced with columnar spacers, even as suggested. It is noted that prior methods for retaining the liquid crystal layer in non-touch-sensor type LCDs would be overly rigid and/or lead to premature breakage of the movable electrode plate if applied directly to the touch-sensor LCD of Fujimori. Thus, Fujimori's disclosure is only complete with respect to the mesh spacer embodiments, and Fujimori does not adequately disclose a workable touch-sensor type LCD having columnar spacers. In addition, Fujimori fails to teach or suggest columnar spacers "wherein a cross-section of each spacer ... is no larger in area than either of said first and second contact surfaces", as recited in Applicants' Claim 1.

The '128 patent reference to Hasegawa et al. shows a LCD device without any provision or support for a touch sensor. Contrary to the Examiner's assertion (*see* Final Office Action at page 4, lines 9-11), although Hasegawa may show columnar spacers with relatively thin mid-sections, there is no teaching or suggestion that both substrate contact surfaces have a contact area greater than the contact area between the two members. The Examiner's comparison of Hasegawa's "width L2" with "width L1" is inapposite because the relationship between the outer widths does not necessarily correspond to the relationship between the associated areas, particularly where the area at the contact portions

is significantly reduced by an inner recessed portion or void as shown by the reference. It is noted that Figures 12 and 13 of Hasegawa may be drawn from a different depth than Figure 11, for example, such that the enclosed void at the contact surfaces is obscured.

In Applicants' prior response dated April 25, 2005, the Examiners' reliance on Hasegawa at col. 23, line 61 through col. 24, line 20, was discussed. This text of Hasegawa refers to Figures 12 and 13 (Hasegawa's "fourth modification"), and the Examiner relied on it for the proposition that the contact area between the spacer members is no larger in area than either of the spacer to substrate contact surfaces. Applicants maintain that this reliance on Hasegawa et al. is misplaced.

Figures 10-11 of Hasegawa (Hasegawa's "third modification"), as somewhat described at col. 22, line 65 through col. 23, line 60, and Figures 17-21 of Hasegawa, as somewhat described at col. 24, line 64 through col. 27, line 3, show a recessed portion or void (sometimes labeled 143) at the top contact surface of the spacers, which may include liquid crystal. It is considered pertinent that Hasegawa elected Figure 11 with its recessed portion 143 as the broadest exemplary figure to be displayed on the front page of the Letters Patent. The recessed portion is not consistently mentioned or labeled even in the views where it is clearly shown. The recessed portion causes a significant reduction in the contact area, even though the diameter of the top around the recessed portion may be wider than the midsection of the spacer. This particular disadvantage was neither recognized nor addressed by Hasegawa.

The above-mentioned citation to Hasegawa at col. 23, line 61 through col. 24, line 20, indicates that in the so-called fourth modification, "the columnar spacer was modified ... and ... comprises ... a resin layer ... formed on the center portion of the top surface of the columnar spacer 112 ... subjecting the spacer 112 to developing by using a developing agent to each the edge portion of the surface and the side wall of the columnar spacer 112. The resin and the developing agent used in the fourth modification similar to that used in the third modification ... the thinnest portion noted above corresponds to L2."

There are apparent grammatical errors in this text of Hasegawa that render it confusing. Specifically, the text "to each the" is improper. This text may have been intended to read "to reach the", "to etch the" or "to each of the". Each of these possibilities lends further support to Applicants' argument that the so-called fourth modification does include an area of resin or other non-spacer material (whether inflexible, unsupportive or unaffixed) at the top of the spacer.

Thus, the "third modification" refers to that of Figures 10 and 11, clearly having the recessed portion or void 143. The text of Hasegawa states that the structure of the fourth modification, which includes Figure 12, is "similar to that used in the third modification". Nowhere does the text of Hasegawa specify that the recessed portion or void has been replaced for greater contact area in the "fourth modification". This is to be expected since Hasegawa was not concerned with the added loads of touch-sensors in a non-touch-sensor type of display, and so had no motivation or recognized advantage for either removing the void or for filling it with spacer material. The fourth modification may have a more shallow

void that still prevents full contact between the spacer and the substrate surfaces.

Thus, Applicants' respectfully submit that even if the width of the midsection of Hasegawa's spacer is thinner than the width of the top portion (e.g., hourglass shape), Hasegawa fails to teach the contact area between the spacer members at said midsection being no greater than the contact area between each spacer member and its respective substrate (e.g., top portion), as effectively recited in Applicants' Claim 1. To the contrary, Hasegawa shows a recess that significantly reduces the contact area at the top portion (see also, e.g., Hasegawa at col. 26, line 65 through col. 27, line 3).

Applicants' Claim 1 recites a relationship between internal contact areas rather than any particular external shape. Such a relationship between areas is obscured, to say the least, in the Hasegawa reference. The Examiner has effectively ignored this fact and treated Applicants' Claim 1 as if it merely recited an external shape. Such a misinterpretation is without merit, facially unreasonable, and cannot be maintained. Therefore, Hasegawa et al. fail to cure at least the deficiency of Fujimori with respect to "cross-section of each spacer parallel to the plane of a substrate at said intermediate point is no larger in area than either of said first and second contact surfaces", as recited in Applicants' Claim 1. Accordingly, the recitations of Applicants' Claim 1 are neither taught nor suggested by Fujimori in view of Hasegawa, whether taken alone or in combination with any of the other references of record in this case.

In addition, even if one of ordinary skill in the pertinent art were to combine the showings of Fujimori and Hasegawa, one would not have arrived at Applicants' presently claimed invention without undue experimentation. Because Fujimori in view of Hasegawa neither teaches nor suggests each and every element of Claim 1, it is respectfully asserted that no *prima facie* case of obviousness has been made. Accordingly, this rejection of Claims 1, 5, 10 and 12 should be reversed for at least the above reasons.

(ii). There was insufficient motivation to combine Fujimori in view of Hasegawa.

There was insufficient motivation to combine Hasegawa with Fujimori. Even if the Examiner's interpretation of Hasegawa as teaching removal of the recess and the resulting greater contact area is ultimately upheld for a purpose other than Applicants', there would remain the issue of whether there was sufficient motivation to combine the spacers of Hasegawa with the touch-sensor LCD of Fujimori at the time of Applicants' invention.

Although Fujimori is directed to touch-sensor type LCDs and analogous art, Hasegawa is merely directed to display-only type LCDs. Thus, Hasegawa et al. not only failed to teach the advantages of any particular spacer designs for touch-sensing, but completely failed to recognize the need for spacers that could withstand the forces of touch-sensing while isolating the deformation to the center of the spacers and away from the contact surfaces with the substrates, which is a novel advantage of Applicants' claimed invention.

Thus, even if Hasegawa does show spacers having features comparable to those of Applicants, Hasegawa offered no motivation to combine such spacers with a touch-sensor type LCD. That is, one of ordinary skill in the pertinent art at the time of Applicants' invention would not have found motivation in Hasegawa to combine Hasegawa's display-only type LCD spacers with the touch-sensor type LCD of Fujimori. There was no suggestion in Hasegawa that such spacers would even hold up to touch-sensor usage, much less provide an advantage.

Fujimori did not provide the requisite motivation either. Fujimori is directed to touch-sensor type LCDs. Fujimori failed to teach or suggest columnar spacers with a narrow midsection. In addition, Fujimori failed to recognize not only the effect of localizing deformation in the mid-section of the spacers, but also failed to recognize the need to reduce stresses at the spacer to substrate interfaces, or to localize deformation in shear to the interface between two spacer members. Therefore, neither Hasegawa nor Fujimori provided sufficient motivation to combine the spacers of Hasegawa's display-only type LCD with touch-sensor type LCD of Fujimori.

The suggestion to combine the references should come from the prior art, and the Examiner cannot use improper hindsight gleaned from the invention itself to pick and choose among disclosures in the prior art for combination to arrive at the claimed invention. *In re Fine*, 837 F.2d at 1075. In addition, it is respectfully submitted that such motivation would not have been found by one of ordinary skill in the pertinent art from the state of knowledge existing prior to Applicants'

discovery. Accordingly, this rejection of Claims 1, 5, 10 and 12 should be reversed for at least the above reasons.

B. Claims 13-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yanagawa in view of Hasegawa.

(i). Yanagawa is unavailable as a reference.

Applicants' actual United States filing date is August 8, 2000. The Japanese Application Publication No. JP 2000-227596 by Yanagawa et al. (Yanagawa) was first published on August 15, 2000, in the Japanese language. Thus, Yanagawa is unavailable as a reference under 35 U.S.C. § 102(a), *et seq.*, since it was first published after Applicants' United States filing date and constructive date of invention.

Because any combination of references with Yanagawa cannot be supported by this unavailable reference, it is respectfully asserted that no *prima facie* case of obviousness has been made for the time of Applicants' invention. Accordingly, this rejection of Claim 13 should be reversed for at least the above reasons.

(ii). Hasegawa fails to teach or suggest "a cross-section of each spacer parallel to the plane of a substrate at said intermediate point is no larger in area than either of said first and second contact surfaces" as claimed in Claim 13.

Claim 13 recites, *inter alia,* a "touch sensor type liquid crystal display comprising: a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap; and gap controlling spacers, each of which restricts a width of the gap and a spacer movement in a planar direction, each of the spacers having two members with one of the two members contacting the first substrate and the other of the two members contacting the second substrate and the two members contacting each other at a point intermediate between the first and second substrates, the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces, wherein arranged densities of said gap controlling spacers are not uniform" (emphasis added).

Thus, Claim 13 recites subject matter in which spacers have two members where the cross-sectional area at the contact section between the spacer members is no larger than the contact area between either spacer member and its respective substrate, and the arranged density of spacers is not uniform.

As discussed above with respect to Claim 1, the Examiner's reliance on the '128 patent reference to Hasegawa et al. is suspect. Applicants have reasoned that there is no teaching or suggestion in Hasegawa for "the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces", as recited in Claims 1 and 13. With respect to the specific rejection of Claim 13,

Hasegawa et al. fails to teach or suggest any provision or support for a "touch-sensor type" LCD. Further, Hasegawa also fails to show "wherein arranged densities of said gap controlling spacers are not uniform".

Because Hasegawa does not support all elements of the claim, it is respectfully asserted that no *prima facie* case of obviousness has been made for Applicants' claimed invention. Accordingly, this rejection of Claim 13 should be reversed for at least the above reasons.

C. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujimori in view of Hasegawa further in view of Hatano.

(i). Fujimori in view of Hasegawa further in view of Hatano fails to teach or suggest "arranged densities of said gap controlling spacers are set according to the number of times of touching the touch sensor" as claimed in Claim 3.

Claim 3 recites the "touch sensor type liquid crystal display according to claim 2, wherein arranged densities of said gap controlling spacers are set according to the number of times of touching the touch sensor".

The discussion above with respect to the Claims 1 and 2 rejections based on Fujimori in view of Hasegawa are equally applicable here. Hatano is generally directed towards a non-touch sensor type LCD. The Examiner has relied on Hatano to show "arranged densities of said gap controlling spacers are set according to the number of times of touching the touch sensor". Such reliance is misplaced, particularly in the context of Hatano's showings of non-

touch LCDs. Nowhere does Hatano disclose an LCD touch sensor, much less one that is designed to be touched repeatedly, such as by a user. It is respectfully submitted that any provision for touch in Hatano is merely incidental, such as during a manufacturing process or regular viewing, and is in any event completely unrelated to a touch sensor.

Such a misinterpretation is without merit, facially unreasonable, and cannot be maintained. Because Hatano cannot support this claim, it is respectfully asserted that no *prima facie* case of obviousness has been made for the time of Applicants' invention. Accordingly, this rejection of Claim 3 should be reversed for at least the above reasons.

D. Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujimori in view of Hasegawa and further in view of Yanagawa.

(i). Yanagawa is unavailable as a reference.

Claim 4 recites the "touch sensor type liquid crystal display according to claim 2, wherein an arranged density of said gap controlling spacers is high in a center of the liquid crystal display panel". As discussed above with respect to Claims 13-18, Yanagawa is unavailable as a reference. Thus, the Examiner's reliance on Yanagawa for the showing of "an arranged density of said gap controlling spacers is high in a center" cannot be maintained. Accordingly, this rejection of Claim 4 should be reversed for at least the above reasons.

E. Conclusion

The claimed invention is not disclosed or suggested by the teachings of the applied prior art references, whether taken alone or in combination. Yanagawa is unavailable as a reference. Moreover, the Examiner has failed to establish a *prima facie* case of obviousness of the presently claimed invention under 35 U.S.C. § 103(a) over the combination of Fujimori, Hasegawa and/or Hatano with or without various other references for at least the reasons discussed above. Accordingly, it is respectfully requested that the Board reverse all rejections of Claims 1-20 under 35 U.S.C. § 103(a).

Respectfully submitted,

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CLAIMS APPENDIX

1. (Previously Presented) A touch sensor type liquid crystal display comprising:

a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap;

a plurality of columnar gap controlling spacers, each of which restricts a width of the gap and a spacer movement in a planar direction, each of the spacers having two members with one of the two members contacting the first substrate to define a first contact surface and the other of the two members contacting the second substrate to define a second contact surface and the two members contacting each other at a point intermediate between the first and second substrates, wherein a cross-section of each spacer parallel to the plane of a substrate at said intermediate point is no larger in area than either of said first and second contact surfaces; and

a touch sensor added to the liquid crystal display panel including fixed and movable electrode plates.

2. (Original) The touch sensor type liquid crystal display according to claim 1, wherein said gap controlling spacers are regularly arranged in a planar direction of the liquid crystal display panel.

3. (Original) The touch sensor type liquid crystal display according to claim 2, wherein arranged densities of said gap controlling spacers are set according to the number of times of touching the touch sensor.

4. (Original) The touch sensor type liquid crystal display according to claim 2, wherein an arranged density of said gap controlling spacers is high in a center of the liquid crystal display panel.

5. (Previously Presented) A touch sensor type liquid crystal display comprising:

a liquid crystal display panel having array and color filter substrates arranged oppositely to each other by a specified gap;

a gap controlling spacer for restricting a width of the gap and a spacer movement in a planar direction, each spacer having two members with one of the two members contacting the array substrate and the other of the two members contacting the color filter substrate and the two members contacting each other at a point intermediate between the array and color filter substrates, the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces; and

a touch sensor added to the liquid crystal display panel including fixed and movable electrode plates; and

a grid arranged between the fixed and movable electrode plates,

wherein arranging positions of said gap controlling spacer and said grid are coincident with each other.

6. (Original) The touch sensor type liquid crystal display according to claim 5, said display being constructed by laminating together said liquid crystal display panel having the array and color filter substrates arranged oppositely to each other by interpolating a liquid crystal layer, and a touch sensor panel having the movable and fixed electrode plates arranged oppositely to each other by a specified gap.

7. (Original) The touch sensor type liquid crystal display according to claim 6, wherein said movable and fixed electrode plates are made of plastic films.

8. (Previously Presented) The touch sensor type liquid crystal display according to claim 5, wherein said array and color filter substrates of the liquid crystal display panel are arranged oppositely to each other by interpolating a

liquid crystal layer, said movable electrode plate serves as a touch sensor arranged oppositely to the color filter substrate by a specified gap, and a conductive film is provided to serve as a touch sensor formed on a surface opposite the movable electrode plate.

9. (Original) The touch sensor type liquid crystal display according to claim 8, wherein said movable electrode plate is made of a plastic film.

10. (Previously Presented) A touch sensor type liquid crystal display comprising:

a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap;

a gap controlling spacer formed in a columnar shape for restricting a width of the gap, each spacer having two members with one of the two members contacting the first substrate and the other of the two members contacting the second substrate and the two members contacting each other at a point intermediate between the first and second substrates, the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces; and

a touch sensor added to the liquid crystal display panel including movable and fixed electrode plates.

11. (Original) The touch sensor type liquid crystal display according to claim 10, wherein said gap controlling spacer is arranged in a black matrix region of the liquid crystal display panel.

12. (Previously Presented) A touch sensor type liquid crystal display comprising:

a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap;

a touch sensor added to the liquid crystal display panel including movable and fixed electrode plates; and

a gap controlling spacer for restricting a width of the gap, each spacer having two members with one of the two members contacting the first substrate and the other of the two members contacting the second substrate and the two members contacting each other at a point intermediate between the first and second substrates,

wherein said gap controlling spacer is brought into surface-contact with one selected from the first and second substrates, the gap therebetween being restricted by the gap controlling spacer with the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces.

13. (Previously Presented) A touch sensor type liquid crystal display comprising:

a liquid crystal display panel having first and second substrates arranged oppositely to each other by a specified gap; and

gap controlling spacers, each of which restricts a width of the gap and a spacer movement in a planar direction, each of the spacers having two members with one of the two members contacting the first substrate and the other of the two members contacting the second substrate and the two members contacting each other at a point intermediate between the first and second substrates, the cross-section of each spacer parallel to the plane of a substrate at said intermediate point being no larger in area than either of the substrate contact surfaces,

wherein arranged densities of said gap controlling spacers are not uniform.

14. (Original) The liquid crystal display according to claim 13, wherein an arranged density of said gap controlling spacers is high in a center of the liquid crystal display panel.

15. (Previously Presented) A liquid crystal display as defined in Claim 13 wherein each of the two members of each spacer is columnar in shape.

16. (Previously Presented) A liquid crystal display as defined in Claim 13 wherein the cross-section of each spacer parallel to the plane of a substrate at said intermediate point is smaller in area than either of the substrate contact surfaces.

17. (Previously Presented) A liquid crystal display as defined in Claim 13 wherein said gap controlling spacers are regularly arranged in a planar direction of the liquid crystal display panel.

18. (Previously Presented) A liquid crystal display as defined in Claim 13 wherein an arranged density of said gap controlling spacers is greater in a center of the liquid crystal display panel.

19. (Previously Presented) A liquid crystal display as defined in Claim 1 wherein each of the two members of each spacer is columnar in shape.

20. (Previously Presented) A liquid crystal display as defined in Claim 1 wherein the cross-section of each spacer parallel to the plane of a substrate at said intermediate point is smaller in area than either of the substrate contact surfaces.